

COMPLETE SPECIFICATION

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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in and relating to Tamper-proof Seals

We, AB RESTELLO, a Swedish corporate body, of Vastergatan 4, Lund, Sweden, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a seal of the kind which cannot be closed after being opened without leaving visible marks of having been opened.

When sealing documents of various kinds it is often important that the seal is made in such a way that it cannot be opened without leaving clearly visible marks that the seal has been opened. The usual way in which to make such seals is to dispose a wax seal or banderol on the object to be sealed.

In later times modern thermoplastic materials, such as polyethylene, polypropene and a great many other similar plastics have come into use as protective wrappers for document of various kinds. The reason for this is, of course, that these materials are sealed against humidity and are grease resistant, and further that they can be heat sealed by fusing the material, which gives moisture proof and mechanically strong sealing joints as a consequence of which a sealed plastic envelope provides very good protection for documents placed in the envelope. Of course, it is possible to dispose a seal of sealing wax on a plastic envelope of the kind mentioned above but it has turned out that such a measure does not provide any safety against the envelope being opened by an unauthorized person and being sealed again in such a way as to make it difficult to discover signs of the envelope having been opened.

It is consequently relatively easy to cut open a flattened heat seal provided in a thermoplastic material along one edge of the sealing zone and then to fuse the opened area once

more by means of heat applied under pressure.

The invention consists in an envelope closed by a seal adapted when broken to provide visible signs of such opening, and thus serving as a safeguard against unauthorised opening and reclosure, wherein the seal holds together opposite imperforate edges of a mouth of the envelope, and comprises a sealing line indicating where the edges adhere together, and, adjacent to said sealing line, but spaced from the sealed edge zone defined by the said line, a plurality of sealing lines, each forming the outline of a symbol, such as a letter and/or a numeral, closely arranged in a column, in a position where the symbols will be disrupted if the edges of the mouth of the envelope which are sealed together should be separated to open the envelope.

The portions of the sealing pattern, one in the form of a column of letters, numerals or similar symbols, and the other a preferably straight and continuous sealing line may be parallel to one another.

Further particulars and advantages of the invention will be apparent from the accompanying drawing showing two embodiments of the invention chosen by way of example, and where

Fig. 1 shows a stack of banknotes or the like which is inserted into a thermoplastic tube open at both ends;

Fig. 2 shows a package produced by sealing both ends of the tube with a seal in accordance with the invention;

Fig. 3 shows a document enclosed between two thermoplastic sheets which have then been sealed along their margins.

The seal made in accordance with the invention is intended for thermoplastic materials and is made in such a way that a sealing tool having embossed portions corresponding to the seal pattern is pressed under heat against

the thermoplastic material, which is caused to fuse along the sealing zones corresponding to the embossed portions of the sealing tool. The thermoplastic wrapping material may be

5 in the nature of a tube or bag and may, of course, also be laminated with another material, e.g. paper or cardboard.

Fig. 1 shows how a seamless thermoplastic tube 1 is used as a protective wrapper for a pack of banknotes 2 or the like. The pack of banknotes 2 is inserted into the tube 1 in the manner shown, and the tube is then sealed in accordance with Fig. 2 along the two tube openings. The sealing operation is carried out by means of a sealing tool having an embossed sealing pattern containing two portions, viz. an outer narrow sealing zone extending over the whole width of the tube 1 and forming an effective moisture bar which is intended to protect the contents of the tube 1 and an inner seal consisting of a broken pattern of letters and numerals, the purpose of which is to make it impossible to cut open the plastic material in order to make the contents 2 of the tube 1 accessible and then to reclose the tube without leaving visible signs of the seal having been tampered with. It is possible to cut open the seal along the straight sealing line 3 which defines the inner side of said zone and then to enclose it by pressing together the margins cut open, simultaneously supplying heat, but this does not make the contents 2 of the tube 1 accessible, since the inner seal 4 is still intact.

It will be seen to at the sealing that the free unsealed gaps between two subsequent signs in the sealing pattern should not be so large that the contents of the tube 1 may be taken out completely or partly through these gaps. In order to prevent air from being trapped in the tube 1, giving the tube an inflated cushion-like appearance, the tube may either be flattened mechanically immediately prior to the sealing operation or be emptied of air by means of a suction pump.

Where the object to be enclosed in the package is for instance a flat document 6, it is possible, as shown in Fig. 3, to place the document between two sheets 5 of thermoplastic material. The sheets 5 are sealed to each other with seals made in accordance with the invention and disposed along the margins 9 of the sheets. As in the embodiment described previously, the shown seal consists of two essentially parallel portions, viz. a straight, continuous sealing line 7 and a seal pattern 8 provided inside the said sealing line and being of the kind which cannot be broken open by an unauthorized person and then be reclosed without leaving outer signs of the seal having been broken open. As a result of the sealing being made along all margins 9 of the sheets 5, the outer continuous sealing lines 7 in the seal pattern form a sealing joint closed in itself and extending along the mar-

gins 9 of the sheets 5, said joint forming, together with the sheets 5, a closed and moisture-proof space containing the document 6.

The seal pattern, which is almost indelible, may preferably be used to carry information or to have a checking function of some kind. It may consequently be advantageous that the enterprise or institution which makes the sealing incorporates its characteristic symbol into the seal pattern. It may also be advisable to incorporate into the seal pattern other kinds of information, such as dates, serial numbers or code designations of various kinds.

In order that the seal may easily be controlled and the information incorporated into the seal pattern may easily be understood, it is important that the seal pattern can be read clearly. In order to produce a clear seal pattern it is possible to add a dye to the sealing tool at the same time as the document is heat sealed, or to let the said tool act on the sealing surface through a "dye ribbon". These dyeing methods have certain drawbacks which may be avoided by supplying to the plastic material, at least within the zones to be sealed, agents, e.g. certain bismuth salts, which, when being heated above a certain temperature, are permanently dyed in a hue contrasting to the surrounding portions. Another method of obtaining a clear seal pattern is to select the thermoplastic wrapping material in such a way that at least one of the outer layers is transparent to a degree which is greater than the transparency of adjacent layers. If the outer layer is relatively transparent there will appear refraction phenomena at the sealing zones making these easy to distinguish. The cause of these refraction phenomena is that the air cushion kept between the layers of thermoplastic material at the sealing is pushed aside in the sealing zone when the layers of material fuse along this zone.

Since a heat sealing operation of the kind contemplated here calls for a certain sealing time determined by the sealing temperature, the sealing pressure and the properties of the thermoplastic materials, the sealing device should be designed in such a way that the sealing jaws are locked in the sealing position for such a time that the requirements for an effective seal are fulfilled. In its simplest form such a device may consist of a time delay, but may possibly be supplemented by means sensing the sealing pressure and the sealing temperature.

In order to provide mechanical protection for the documents placed in the sealed wrapper it may be advisable to laminate at least one plastic layer to a stiffer layer of paper or cardboard, the outer side of which may also be provided with informative or advertising text, or provide space for writing.

The sealing tool may either consist of a

metal bar provided with embossed portions corresponding to the seal pattern, or of a continuous wire arranged in the desired seal pattern and disposed on an insulating backing. In both of these cases the sealing tool is preferably heated by an electric current being led through the bar or wire, the latter having the advantage that it may be given considerably less heat capacity than the metal bar, which has to be heated also along the portions which do not carry any pattern. However, it is also possible to dispose a broken pattern of metal types or the like on an insulating backing, which types can be heated by means of a high-frequency magnetic field.

The seal described above is highly suitable for banks and similar institutions which, after counting an amount of money, may keep it in a sealed plastic wrapper, whereby it is possible to check at once that the seal has not been broken and that the amount of money does not, therefore, have to be counted again. On the whole, the seal according to the invention may be used for all purposes where seals of sealing wax or ordinary flattened heat seals of thermoplastic materials are used, and where it is important to be able to decide with certainty whether the seal has been broken open by an unauthorized person.

30 WHAT WE CLAIM IS:—

1. An envelope closed by a seal adapted when broken to provide visible signs of such opening, and thus serving as a safeguard against unauthorised opening and reclosure, wherein the seal holds together opposite imperforate edges of a mouth of the envelope, and comprises a sealing line indicating where the edges adhere together, and, adjacent to said sealing line, but spaced from the sealed

edge zone defined by the said line, a plurality of sealing lines, each forming the outline of a symbol, such as a letter and/or a numeral, closely arranged in a column, in a position where the symbols will be disrupted if the edges of the mouth of the envelope which are sealed together should be separated to open the envelope.

2. A sealed envelope as claimed in Claim 1 wherein at least one of the edges intended to be sealed is disposed in such a way that the sealing area is permanently dyed in a hue contrasting to the surrounding portions when heat is supplied to the sealing area.

3. A sealed envelope as claimed in Claim 1 or 2 wherein the layers of material to be sealed are thermoplastic and at least one of the layers has a transparency different from that of the adjacent layers in order to form a pattern set off distinctly on account of the absence on an air cushion in the sealing zones and consequently changed light reflections and contrasting against the surrounding portions.

4. A method of making a seal in an envelope of thermoplastic material such as claimed in Claim 1, 2 or 3 wherein a sealing tool having embossed portions corresponding to the seal pattern is pressed against the thermoplastic material while heat is being supplied, said material being caused to fuse along the sealing zones corresponding to the embossed portions of sealing tool.

5. A tamper-proof sealed envelope, substantially as described herein with reference to the accompanying drawings.

W. H. BECK, GREENER & CO.,
Chartered Patents Agents,
7, Stone Buildings, Lincoln's Inn,
London, W.C.2.